# THE FREEZING OF COMMERCIAL BAKERY PRODUCTS:

## CURRENT PRACTICES, PROBLEMS, AND PROSPECTS

MARKETING RESEARCH REPORT NO. 674 ■ U.S. DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE ■ MARKETING ECONOMICS DIVISION

## PREFACE

Marketing research in the U.S. Department of Agriculture has as one of its objectives the evaluation of new products and processes in terms of their impact on costs and on acceptance by consumers. Such studies provide industry with information for use in improving marketing practices.

This report is based on a survey to ascertain the present uses of freezing by various segments of the baking industry, to identify advantages and problem areas, and to project the probable future use of freezing by bakers. The study was planned by the Marketing Economics Division, Economic Research Service, with the cooperation and advice of the Western Utilization Research and Development Division, Agricultural Research Service. The latter organization has conducted research for prescribing the best technical conditions for freezing and storing bakery products. The Marketing Economics Division selected and interviewed the bakers, analyzed the data, and prepared this report.

Philip B. Dwoskin, Assistant Chief, Market Potentials Branch, Marketing Economics Division, assisted in development of the questionnaire and in supervising the interviewers. John O. Gerald, Marketing Economics Division, provided many valuable suggestions for selection of firms for interviewing, and for analysis of the data. Donald Jackson, Marketing Economics Division, reviewed various drafts of the manuscript and made many valuable suggestions throughout the study. The project was under the general supervision of Marshall E. Miller, Chief, Market Potentials Branch. Finally, the study would not have been possible without the cooperation of many bakers who gave generously of their time in replying to the many questions asked of them. To all of these individuals the authors express their sincere appreciation.

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## SUMMARY AND CONCLUSIONS

Distribution and sale of frozen bakery products offer many potential benefits to bakers and consumers. Preliminary analysis indicates that distribution and sale of frozen bakery products through grocery stores offer potential cost savings over present methods of distribution. Expansion in the sales of frozen bakery products, plus an apparent increase in the freezing of bakery goods in the home, indicate a growing acceptance of frozen bakery products by consumers. With proper methods of handling, freezing maintains fresh-baked quality until the product is defrosted; thus, by using frozen bakery products consumers may enjoy fresh quality with less frequent purchases than if freezing is not used.

The rate of growth in the number of bakeries using freezing is likely to depend largely on the rate at which bakers get available information regarding proper methods for achieving better quality and information regarding the effect that freezing may have on costs and sales.

During the past several years the baking industry has been confronted with rapidly rising costs and, for all bakery products combined, declining per capita consumption. A major factor in the high costs of bakery products is their perishable nature, which makes it necessary for the baker to produce and distribute most major items on a daily basis. Another factor contributing to the rising costs has been the declining volume of products sold per driver salesman on wholesale routes.

Because of the perishable nature of bakery products, consumers are faced with the inconvenience of purchasing them more than once a week or eating products several days after purchase, thus allowing staling beyond that occurring during distribution.

From 1953 to 1961 the Department of Agriculture had a continuing program of research to prescribe the optimum conditions for freezing, storing, and defrosting bakery products. The purpose of the study reported here was to learn from bakers how they were using freezing, what their experiences had been with it, their expectations concerning its future use, and their evaluation of factors that might influence its growth.

The practice of freezing bakery products has increased steadily since 1950. In recent years, 4 to 5 percent of all bakers have adopted freezing each year. In 1961, nearly 40 percent of the bakers froze part of their production. Products are frozen both before and after baking, but freezing after baking is the more common practice.

Most bakers who used freezing in 1961 did so to achieve the economies of large batch production by making more than a day's supply and freezing the quantity not needed for immediate sale. In this way a baker could have a wide variety of products for daily sale, thus enabling him to increase quantities sold with lower losses from staling than would be experienced without freezing. Bakers using freezing for this purpose generally defrosted most products before they were sold or distributed.

The majority of bakers who defrosted products before they were sold were found to be freezing less than 10 percent of their total production. The reason for this low level was that most items frozen for the purpose of taking advantage of large batch production were low volume items. More retail bakers were found to use freezing than wholesale and grocery-chain bakers. Wholesale and grocery chain bakers were already producing each item in large quantities and, thus, freezing

apparently did not present them with as much opportunity for reducing production costs. Freezing by bakers appeared to be most prevalent in the West. One possible explanation for this is that wage rates were highest in the West. By using freezing, bakers can reduce their labor requirements.

Most bakers using freezing were impressed with its cost-reducing and sales-increasing potential. Most bakers who had never used freezing, or had previously used it but were no longer doing so, said that freezing impaired quality. Some bakers in each group feared that lowered quality would result in poor acceptance of frozen products by consumers. The satisfactory results achieved by many bakers with frozen bakery products, and the high quality obtained in laboratory tests by the Department of Agriculture, suggest that some of the bakers who had previously used freezing might benefit from additional information on the proper procedures. Bakers who had never used freezing, but who felt that freezing impaired quality, may not have been aware of the results attainable with the proper techniques.

Because of the growth in importance of grocery chains, with their demand for products having their own "private label," wholesale bakers in some cases appear to be losing control over and identification with their products. Frozen distribution by wholesale bakers also would tend to result in loss of control over products. If the trend toward private labeling continues, however, wholesale bakers may be more willing to adopt frozen distribution as a possible means for reducing overall distribution costs. Furthermore, some grocery chains are beginning to adopt frozen distribution of bakery products on a large scale. Continued success by these chains is another factor that may lead wholesale bakers to further evaluate the potential benefits of distributing and selling frozen bakery products.

# THE FREEZING OF COMMERCIAL BAKERY PRODUCTS: CURRENT PRACTICES, PROBLEMS, AND PROSPECTS

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## INTRODUCTION

A major problem of the baking industry today is the rapidly rising costs of production and distribution. Major factors in the rising costs have been increasing wage rates, increasing costs for facilities and supplies, and a decline in quantity of products distributed per driver-salesman on wholesale routes. The last results in part from the intense competition for optimum display space in the retail grocery store, with each driver-salesman returning to some stores on his route once a day or more to make sure that his company's brand is available and in the best possible position. 1/

Accompanying these rising costs has been a decline in the per capita sales of bakery products, caused by a reduction in sales of bread other than rolls (table 1).

Table 1.--Annual per capita sales of bakery products, United States, 1947, 1954, and 1958 1/

| Type of product | 1947 | 1954 | 1958 |
|---|---|---|---|
| | Pounds | Pounds | Pounds |
| Bread (other than rolls) | 73.3 | 68.7 | 62.2 |
| Bread rolls | 6.6 | 9.2 | 9.5 |
| Sweet goods, all types | 19.7 | 16.5 | 17.1 |
| Total | 99.6 | 94.4 | 88.8 |

1/ Does not include sales of single unit retail bakeries.

Source: Based on data from The Census of Manufactures, 1958.

Freezing of bakery products is a possible method of reducing costs and increasing sales. Freezing, which stops yeast action in doughs and reduces quality deterioration of baked products, permits bakers to produce a stabilized inventory of products. This permits the economies of large-scale production; permits bakers to have a supply of their products at all times without risking large losses from staling due to the inability of bakers to accurately forecast daily sales; and, if the products are distributed and sold in a frozen state, permits less frequent delivery of products. Furthermore, this innovation may increase sales by making it possible for consumers to purchase a wider variety and new forms of bakery products in the grocery store. The selling of frozen dough, for example, is becoming increasingly popular.

1/ Walsh, Richard G. and Evans, Bert M. Economics of Change in Market Structure, Conduct, and Performance, the Baking Industry, 1947-1958. No. 28 (n.s.) Univ. Nebr. Studies, Lincoln, Nebr., Dec. 1963, pp. 143-149.

## Objectives of Study

The major objective of this study was to ascertain the present and prospective extent of freezing bakery products and to provide information useful to bakers in making decisions regarding the use of freezing in their operations. Specific objectives were to ascertain:

(1) The extent of freezing by various types of bakeries and for different types of products.

(2) Reasons for freezing or not freezing and the effect of freezing on costs and sales.

(3) Bakers' expectations with respect to the future use of freezing.

(4) Bakers' appraisals of trends in the baking industry that may influence their use of freezing.

(5) The procedures used by bakers for freezing, storing, and defrosting bakery products, the technical problems encountered, and the way these are being resolved in practice.

## Procedure

Bakers in 28 cities located throughout the United States were interviewed to obtain the basic data for this study (table 2). The first stage consisted of telephone interviews of 1,339 bakers. In the second phase, a more comprehensive personal interview was completed with each of 379 bakers selected from the 1,339 who were interviewed by telephone. The interviews were made during the period June 1961 to March 1962.

Table 2.--Cities selected for survey of the baking industry, 1961-62

| NORTHEAST | SOUTH |
|---|---|
| Boston, Mass. | Baton Rouge, La. |
| Hartford, Conn. | Fort Worth, Tex. |
| New York, N.Y. | Houston, Tex. |
| Philadelphia, Pa. | Jacksonville, Fla. |
| Rochester, N.Y. | Knoxville, Tenn. |
| Scranton, Pa. | Memphis, Tenn. |
| | New Orleans, La. |
| NORTH CENTRAL | Norfolk, Va. |
| | Washington, D.C. |
| Canton, Ohio | |
| Chicago, Ill. | WEST |
| Cincinnati, Ohio | |
| Detroit, Mich. | Denver, Colo. |
| Grand Rapids, Mich. | Los Angeles, Calif. |
| Kansas City, Mo. | Portland, Oreg. |
| Omaha, Nebr. | San Francisco, Calif. |
| St. Louis, Mo. | Spokane, Wash. |

The assumption was made that city size was not a determinant in a baker's decision to use freezing; therefore, to keep survey costs as low as possible, only cities of over 100,000 were considered in selecting the 28 cities. These cities were grouped by region and listed in order of size. The method of selection resulted in the largest cities having the greatest probability of selection and the region with the largest number of cities over 100,000 having the greatest representation. If a city considered was within 50 miles of one that had already been selected the next city in the region was selected in its place. Lists of bakeries were developed from telephone and city health department listings in the 28 cities.

The Bureau of the Census divides the baking industry into various segments based on the way products are distributed, form of ownership, and number of bakeries under one ownership. The classifications used and the relative importance of each type of establishment in 1958, in terms of number of establishments, number of employees, and value of sales, are given in table 3.

Table 3.--Bakery statistics, United States, 1958

| Type | Number of establishments | Number of employees | Value of shipments 1/ | Percentage of total industry | | |
|---|---|---|---|---|---|---|
| | | | | Establishments | Employees | Shipments |
| | Number | Number | Thousand dollars | Percent | Percent | Percent |
| Single unit retail | 19,235 | 83,532 | 904,981 | 76 | 24 | 18 |
| Multiunit retail | 247 | 14,065 | 179,590 | 1 | 4 | 3 |
| Wholesale | 5,199 | 193,527 | 3,130,415 | 21 | 57 | 63 |
| Grocery chain | 178 | 18,869 | 382,499 | 1 | 6 | 8 |
| Home service | 361 | 30,502 | 406,108 | 1 | 9 | 8 |
| Total | 25,220 | 340,495 | 5,003,593 | 100 | 100 | 100 |

1/ Net sales value of all products sold. Based on wholesale prices for wholesale bakeries and retail prices for all other classifications.

Sources: 1958 Census of Business; v. 2, Retail Area Statistics, pt. 1, U.S. Summary Plus Alabama-Mississippi, table 1, pp. 1-5; and 1958 Census of Manufactures, v. 2, Industry Statistics, pt. 1, General Summary and Major Groups 20 to 28.

Based on the Bureau of Census classification, but with some modifications, the lists of bakeries in the 28 survey cities were classified into eight groups as follows:

Single unit retail.--A bakery which is the only bakery operated by a company that sells chiefly to consumers for consumption off the premises.

Multiunit retail.--A bakery operated by a firm operating two or more bakeries or selling through two or more outlets chiefly to consumers for consumption off the premises.

Single unit wholesale.--A bakery which is the only bakery operated by a company that sells chiefly to other establishments for resale.

Multiunit wholesale.--A bakery operated by a firm operating two or more bakeries or selling through two or more outlets chiefly to other establishments for resale.

Institutional.--A bakery that produces products chiefly for serving to their customers for consumption on the premises. Examples are hospitals, restaurants, hotels, and cafeterias.

Grocery chain.--A bakery that produces chiefly for selling to consumers through grocery stores owned by the same firm.

Home service.--A bakery that sells chiefly house-to-house.

Doughnut shop.--An establishment that produces chiefly doughnuts.

From these establishments, 1,339 were selected for telephone interview (table 4). The objective was to get for the four regions as nearly the same number of bakeries of each type as possible. In many cities, all bakeries in each classification were included. Even so, the objective of having an equal number in each classification was not achieved.

Table 4.--Bakers interviewed by telephone, by type of bakery and region, 1961

| Type | Northeast | North Central | South | West | U.S. |
|---|---|---|---|---|---|
| | Number | Number | Number | Number | Number |
| Single unit retail | 131 | 105 | 89 | 88 | 413 |
| Multiunit retail | 92 | 92 | 39 | 32 | 255 |
| Single unit wholesale | 107 | 89 | 72 | 58 | 326 |
| Multiunit wholesale | 7 | 17 | 25 | 14 | 63 |
| Institutional | 78 | 25 | 13 | 22 | 138 |
| Grocery chain | 10 | 16 | 7 | 15 | 48 |
| Home service | 1 | 5 | 2 | 6 | 14 |
| Doughnut shops | 18 | 13 | 18 | 33 | 82 |
| Total | 444 | 362 | 265 | 268 | 1,339 |

The purpose of the telephone survey was to ascertain (1) whether bakeries were classified correctly, (2) whether they were freezing some products, (3) the proportion of total production that was being frozen, and (4) when they had started to use freezing.

From the telephone contact, approximately equal numbers of bakers of each type who were freezing some products and who were doing no freezing were selected for more comprehensive personal interviews. The 379 bakers interviewed represented a cross section of each important type of bakery in each geographic region, as shown in table 5. Classification of these bakeries by type of product made, by weekly sales volume, and by number of bakeries owned by the firm is shown in appendix tables 29-31.

## HISTORY AND POSSIBLE USES OF FREEZING OF BAKERY PRODUCTS

The freezing of bakery products originated with farm families, hunters, and trappers in cold climates. Research on the freezing of bakery products was conducted at a commercial laboratory as early as 1930. In 1932 the U.S. Navy carried out experiments in supplying frozen bread to submarines and small vessels. In 1947, on a

Table 5.--Bakers interviewed in person, by type of bakery, region, and use of freezing, 1961-62

| Type | Northeast | | North Central | | South | | West | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freezing | Not freezing | Freezing | Not freezing | Freezing | Not freezing | Freezing | Not freezing | Freezing | Not freezing |
| | Number | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| Single unit retail | 13 | 17 | 11 | 8 | 14 | 16 | 15 | 13 | 53 | 54 |
| Multiunit retail | 7 | 7 | 9 | 6 | 8 | 2 | 15 | 5 | 39 | 20 |
| Single unit wholesale | 6 | 6 | 10 | 10 | 7 | 4 | 10 | 9 | 33 | 29 |
| Multiunit wholesale | 5 | 7 | 4 | 7 | 4 | 10 | 2 | 6 | 15 | 30 |
| Grocery chain | 2 | 1 | 3 | 4 | 1 | 5 | 3 | 4 | 9 | 14 |
| Home service | 0 | 4 | 1 | 2 | 0 | 1 | 1 | 3 | 2 | 10 |
| Institutional | 6 | 9 | 7 | 6 | 1 | 6 | 6 | 6 | 20 | 27 |
| Combination | 1 | 2 | 2 | 2 | 5 | 3 | 6 | 3 | 14 | 10 |
| Total | 40 | 53 | 47 | 45 | 40 | 47 | 58 | 49 | 185 | 194 |

return expedition to Little American III, Admiral Byrd reported that his party of explorers used the food, including bread, that had been preserved in a frozen state since the last expedition. 2/

From 1953 to 1961, the Department of Agriculture's Western Regional Research Laboratory had a continuing program of research for prescribing optimum conditions for freezing, storing, and defrosting various bakery products. 3/

The end of World War II marked the beginning of commercial freezing of bakery products. It was then that frozen unbaked pies began to be sold. Since that time, the commercial freezing of bakery products has become increasingly more important. This trend is reflected in the data collected for this study (fig. 1). In 1949, only 3 percent of the 1,339 bakers in the 28 cities surveyed used freezing. By 1954, this had increased to 12 percent. After 1954, bakers initiated the use of freezing at a faster rate, with 39 percent using freezing by 1961.

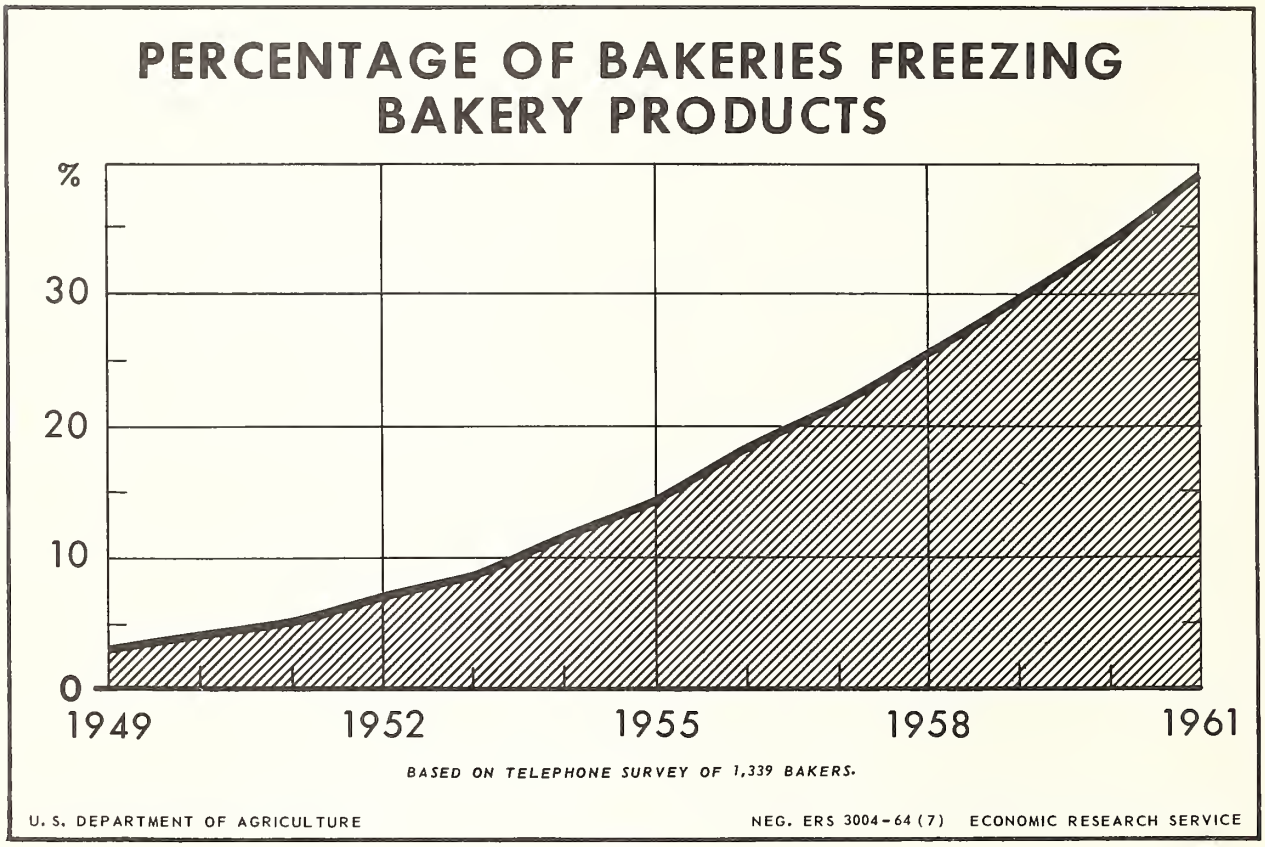


Figure 1

2/ Material in this paragraph was adapted from the following: (1) The Freezing Preservation of Foods; v. 2, Freezing of Precooked and Prepared Foods; by D. K. Tressler and C. F. Evers; Avi Publishing Co., Westport, Conn. 1957; and (2) Ninety Degrees South, by Paul Siple, 1959.

3/ The results of this research were reported in a number of publications which can be obtained from the Western Utilization Research and Development Division, Agricultural Research Service, U.S. Dept. Agr., 800 Buchanan St., Albany, Calif. 94710.

The increasing availability to the consumer of frozen bakery products is apparent. However, it is not as widely known that large quantities of bakery products are frozen in various stages of preparation and subsequently defrosted before being sold to the consumer.

Many of the ways in which freezing can be used are shown in figure 2. The grey boxes show the possibilities for temporary frozen storage. The flow lines suggest alternative ways in which freezing can be used. One of these is to shift the proofing and baking operations, or just the baking, to the consumer, restaurant operator, or sub-bakery. 4/ This permits makeup of products in centralized large-scale plants, with the possible economies associated with large size. Products can then be frozen to be baked elsewhere, for instance, in grocery store bakeries. Because of the appeal of fresh aroma and attractive appearance this practice reportedly results in higher sales. Also, this technique can be used in institutions and restaurants to have freshly baked items readily available at all times, possibly at lower cost than if these bakeries made the products themselves.

Freezing baked products in a central plant and shipping them frozen to distant markets is another use of freezing that may offer some advantages. Upon arrival, products can either be defrosted before local delivery or delivered to retail stores in frozen form. In the latter case, products either can be defrosted before being sold to the consumer or sold in frozen form. Frozen distribution permits less frequent delivery to retail outlets and also reduces, if it does not eliminate entirely, losses from stale products.

## Current Use of Freezing

In 1961, a greater percentage of bakeries in the West were using freezing than in other regions of the country (fig. 3). This finding is based on information from the 1,339 bakers interviewed by telephone.

Use of freezing was most common among multiunit retail bakeries, being used in 56 percent (fig. 4). In contrast, it was relatively unimportant among multiunit wholesale bakeries, being used in only 12 percent. The use of freezing among the other types of bakeries fell between these extremes.

A possible reason that freezing is more prevalent among retail bakeries is that they produce a larger number of different products in relatively small quantities and have larger daily sales variation than other types of bakeries. By using freezing, they can make larger batches of each product for a frozen inventory, which can subsequently be defrosted as needed for sale. This was the practice followed by most retail bakers in the survey who used freezing. Its advantage is that all varieties of products may be available at all times with lower production costs and less loss from stale products than if smaller quantities of each variety are produced daily. Specific reasons cited by bakers for use of freezing are given in a later section.

The preceding findings are based on responses by the 1,339 bakers who were interviewed by telephone. These bakers were interviewed to ascertain the actual proportion of bakers freezing some products and those freezing none and when the use of freezing had been initiated. Except where noted, the following findings are based on

4/ Proofing is the process whereby fermentation of yeast results in expansion of volume of bakery products prior to baking. A sub-bakery is one that receives unbaked products from another bakery and bakes them before sale.

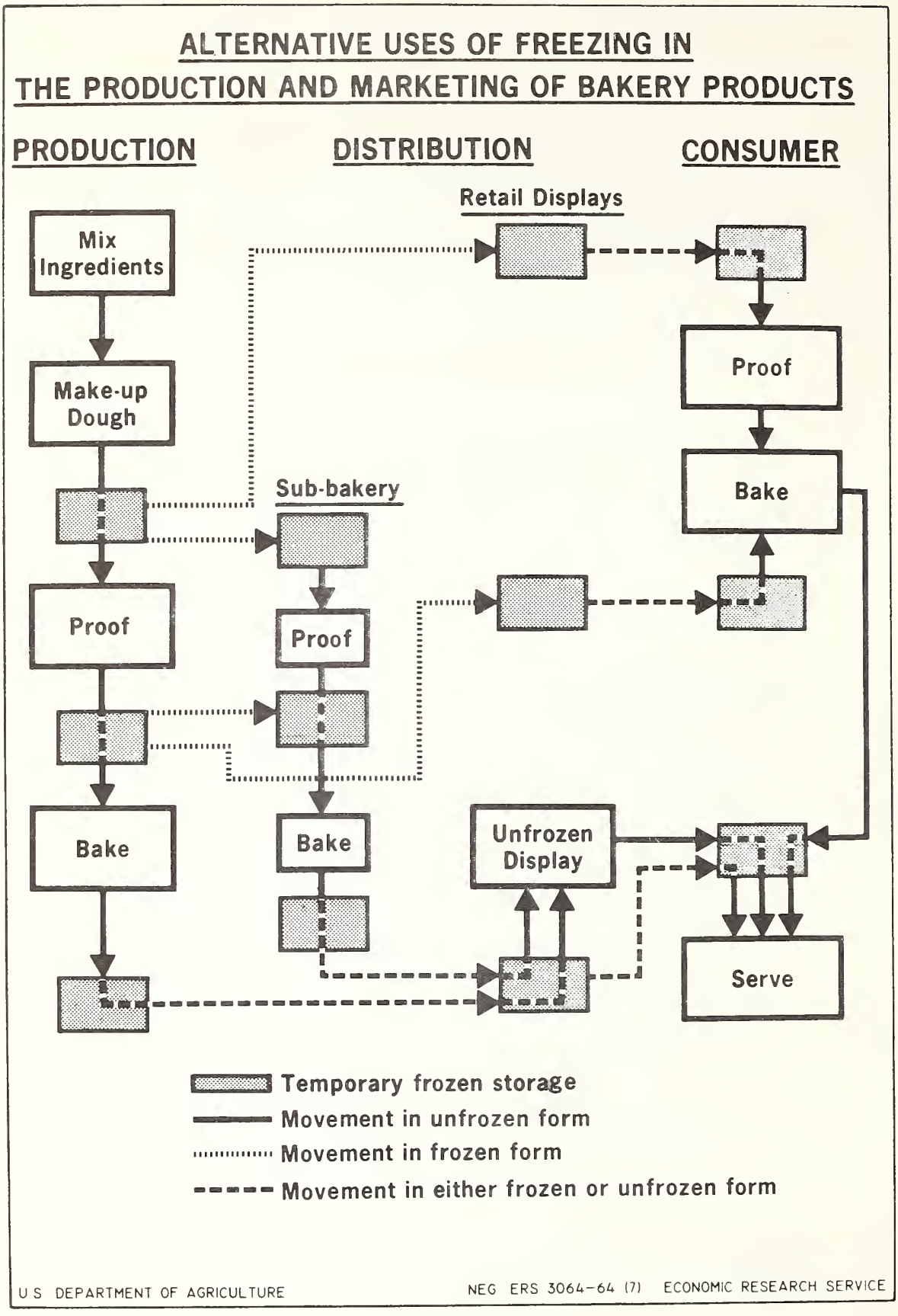
ALTERNATIVE USES OF FREEZING IN
THE PRODUCTION AND MARKETING OF BAKERY PRODUCTS
PRODUCTION
DISTRIBUTION
CONSUMER
Retail Displays
Mix Ingredients
Make-up Dough
Proof
Bake
Sub-bakery
Proof
Bake
Proof
Bake
Unfrozen Display
Serve
Temporary frozen storage
Movement in unfrozen form
Movement in frozen form
Movement in either frozen or unfrozen form
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Figure 2

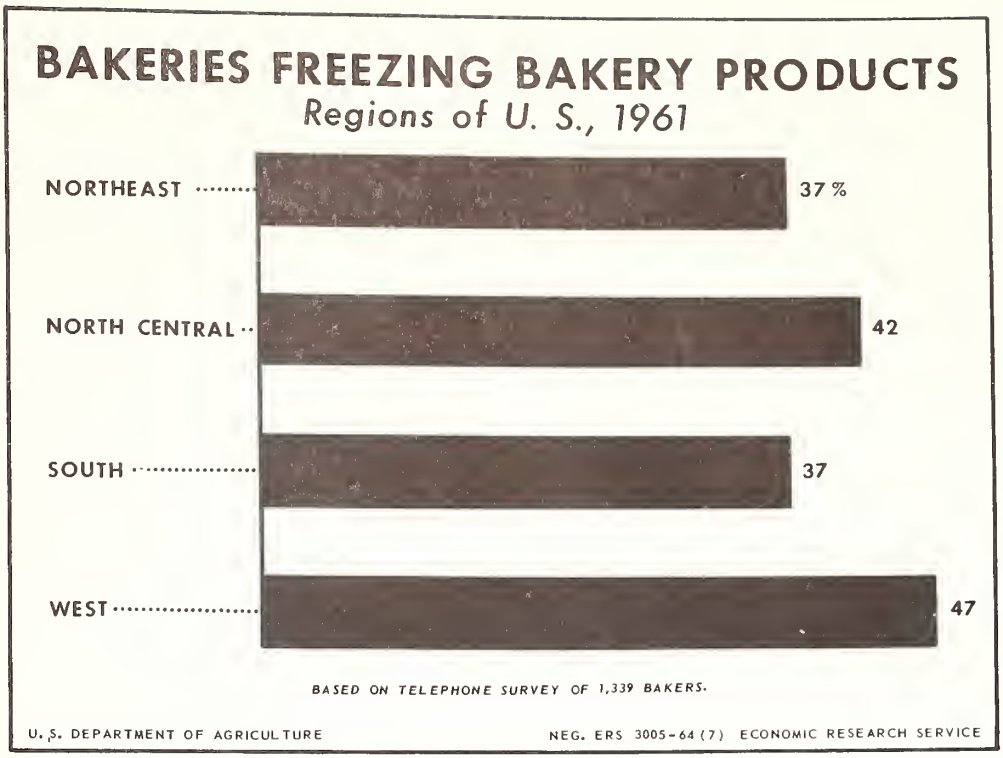


Figure 3

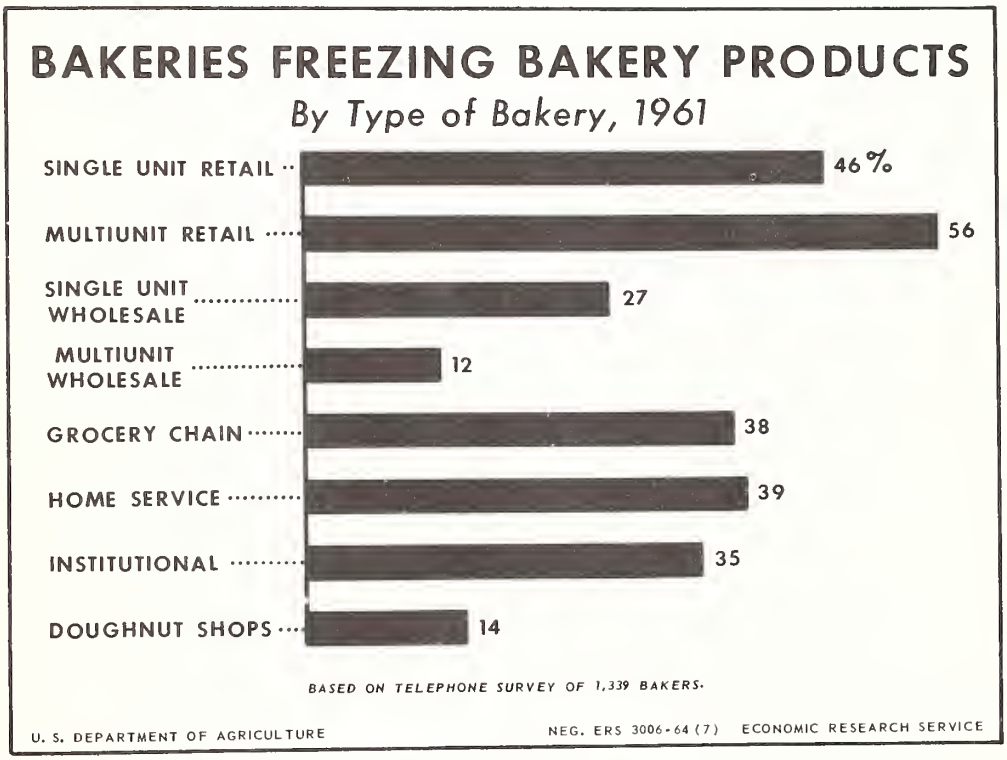


Figure 4

responses from bakers selected for personal interview. This group was purposely chosen to represent, as nearly as possible, equal numbers of bakers using freezing and not using freezing. These bakers were interviewed to ascertain the types of products being frozen, the quantities frozen, the form in which products were frozen, the practices used for freezing and defrosting, and the effect of freezing on costs and sales.

## Influence of Type of Product

The use of freezing by bakeries specializing in different types of products varied widely, as shown in figure 5. Of those bakeries making only bread and bread rolls, only 20 percent froze some products. The use of freezing in the 100-percent doughnuts category was also low. On the other hand, of the bakeries producing a combination of products, classified as "other," 60 percent froze some products.

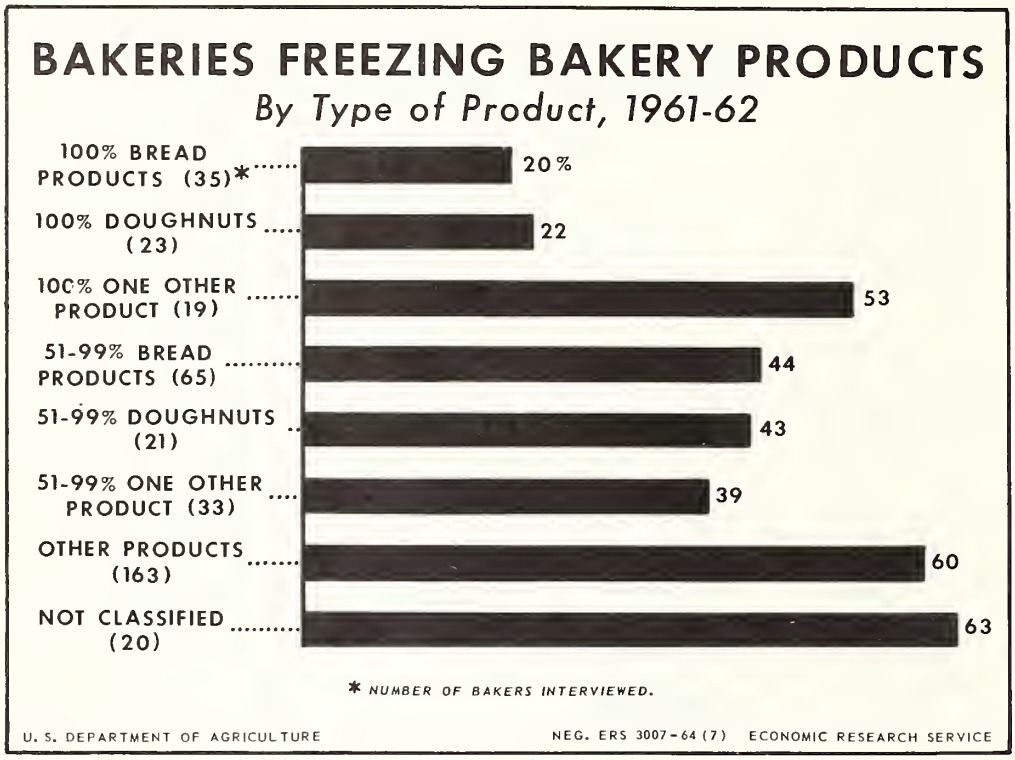


Figure 5

The "100-percent bread products" group consisted mostly of large-scale wholesale bakeries (appendix table 29). Most bakeries of this type may not be able to make a significant reduction in their production costs by having a frozen inventory for later sale in unfrozen form. Freezing, however, may have a role in some of these bakeries for reducing losses when anticipated demand does not materialize. In such cases excess production of otherwise perishable products can be frozen for sale at a later date. Furthermore, many of these bakeries may find in frozen distribution a means of expanding their sales area and reducing their distribution costs.

Most of the bakeries in the "100 percent one other product" classification were either cake or pie bakeries. Many of these, especially the pie bakeries, produced a line of products that were sold in frozen form.

Bakeries in the 51 to 99 percent classifications and those not classified by type of product, were mostly retail or small wholesale bakeries that produced a large number of different products. Many of these had large daily sales variation which results in costly stale losses when freezing is not used.

## Proportion of Production Frozen

Nearly half of the bakeries freezing unbaked products and slightly over half of those freezing baked products were freezing 10 percent or less of their production (table 6). A small number of bakeries, many of which specialized in one type of product, such as pies, were freezing all of their production. Although only a small percentage of production was being frozen by most bakeries, this level of freezing may have contributed significantly to the efficient use of production labor and facilities. For example, because of fluctuations in daily demand a bakery might be required to operate at overtime wage rates on some days and operate less than a full day on others. By use of freezing the bakery would be able to produce enough on slack days to carry over to days of peak demand.

Table 6.--Bakers freezing various quantities of their production in the unbaked and baked state, 1961

| Porportion of production frozen | Percentage of Bakers freezing specified proportion of-- | |
|---|---|---|
| | Unbaked products 1/ | Baked products |
| | Percent | Percent |
| 1-10 percent | 45 | 54 |
| 11-25 percent | 21 | 19 |
| 26-50 percent | 8 | 7 |
| 51-75 percent | 4 | 2 |
| Over 75 percent | 5 | 2 |
| Unknown | 17 | 16 |
| Total | 100 | 100 |

1/ Based on telephone survey of 1,339 bakers, of whom 331 were freezing unbaked products and 425 were freezing baked products. Since some bakers freeze both unbaked and baked products, the categories are not mutually exclusive.

## Form of Products Frozen

The form in which bakery products were frozen, that is, unbaked or baked, varied with the type of product and the manner of distribution intended. Of the 1,339 bakers interviewed, 39 percent were freezing some portion of their production. Of these bakers, the proportions freezing products in various forms were as follows:

| | Percent |
|---|---|
| Unbaked only | 18 |
| Baked only | 38 |
| Both unbaked and baked | 44 |
| Total | 100 |

Some types of product were more likely to be frozen in one form than the other. Grocery chain, retail, institutional, and combination bakeries, all of which made a wide variety of products, reported the greatest percentages freezing products in both forms (table 7). In contrast, wholesale bakeries, which generally produced mainly bread and cakes, showed the largest percentage freezing baked products only.

Table 7.--Bakers freezing unbaked products only, baked products only, or both, by type of bakery, 1961-62

| Type | Unbaked only | Baked only | Both unbaked and baked | Total | |
|---|---|---|---|---|---|
| | Percent | Percent | Percent | Percent | Number |
| Single unit retail | 8 | 26 | 66 | 100 | 53 |
| Multiunit retail | 15 | 26 | 59 | 100 | 39 |
| Single unit wholesale | 24 | 55 | 21 | 100 | 33 |
| Multiunit wholesale | 20 | 60 | 20 | 100 | 15 |
| Grocery chain | 0 | 11 | 89 | 100 | 9 |
| Home service | 50 | 50 | 0 | 100 | 2 |
| Institutional | 10 | 35 | 55 | 100 | 20 |
| Combination | 0 | 43 | 57 | 100 | 14 |

The forms in which specific products were frozen are shown in table 8. All of the products except pies and sweet yeast goods had a larger portion frozen in the baked than the unbaked form. Unbaked pies were the most popular of all bakery products sold in frozen form. One possible reason that more sweet goods were frozen in unbaked than baked form is that for many years bakers have used retarders (refrigerators) for slowing down the proofing of sweet yeast doughs which are frequently made up in larger batches than oven capacities can accommodate; therefore, the use of freezing for this purpose was not a major change.

Another important factor influencing the form in which bakery products were frozen is the effect on quality. Frozen baked pies, for example, tend to become soggy when defrosted. A partial explanation for the relative insignificance of freezing of unbaked cakes is that baked cakes generally freeze well and the freezing of cake batters requires a larger inventory of cake pans.

The percentage of bakeries that froze specified numbers of unbaked and baked products is given in table 9. Eighty-eight percent of those that froze unbaked products, and 81 percent of those that froze baked products, froze three products or fewer in each form. However, those bakeries freezing only one product represented a much larger proportion of the bakeries freezing unbaked products than of those freezing baked products. This is an indication that freezing of baked products generally had better acceptance than freezing of unbaked products.

Table 8.--Form in which bakery products were frozen, by type of product, 1961-62

| Type of product | Unbaked | Baked | Total | Number of bakers reporting |
|---|---|---|---|---|
| | Percent | Percent | Percent | Number |
| Bread, white pan | 29 | 71 | 100 | 31 |
| Bread, all other | 11 | 89 | 100 | 54 |
| Bread rolls | 36 | 64 | 100 | 95 |
| Soft cakes | 6 | 94 | 100 | 109 |
| Sweet yeast goods | 63 | 37 | 100 | 128 |
| Pies | 75 | 25 | 100 | 73 |
| Doughnuts, cake | 3 | 97 | 100 | 29 |
| Doughnuts, yeast | 41 | 59 | 100 | 22 |
| Cookies | 41 | 59 | 100 | 27 |
| Pastries | 42 | 58 | 100 | 48 |
| Other items 1/ | 44 | 56 | 100 | 16 |

1/ Includes bagles, pizzas, fruitcakes, bread puddings, and bread stuffing.

Table 9.--Bakers freezing specified numbers of unbaked or baked products, 1961-62

| Item | Unbaked | Baked |
|---|---|---|
| | Percent | Percent |
| Number of products frozen: | | |
| One | 44 | 27 |
| Two | 26 | 27 |
| Three | 18 | 27 |
| Four | 9 | 10 |
| Five | 2 | 3 |
| Over five | 1 | 6 |
| Total | 100 | 100 |
| | Number | Number |
| Bakers reporting | 119 | 160 |

## PRACTICES USED FOR FREEZING AND HANDLING BAKERY PRODUCTS

Practices used for freezing and storage greatly influence the quality of bakery products. Therefore, knowledge of the proper procedures by bakers may be one of the determinants in the future growth and acceptance of bakery products that have been frozen.

The 185 bakers using freezing were asked how they decided on the practices for freezing and storing frozen products. The number of bakers giving various means were as follows:

| | Number of bakers |
|---|---|
| Experimentation | 139 |
| Experience | 61 |
| Information from literature, television, and bakery conventions | 63 |
| Information from freezer and bakery supply companies | 57 |
| Conversations with other bakers | 31 |
| Used same temperatures as for other products | 8 |
| Other means | 12 |

More widespread use of available research results could reduce the risks involved in freezing and improve the quality of products.

## Proofing of Frozen Unbaked Products

One of the important steps in the baking of yeast-raised products is the proofing process. Bakers reported that nearly 70 percent of the products that they froze unbaked were of types that required proofing at some time before baking. Of these products, nearly 85 percent were proofed before freezing.

The decision on whether to proof before or after freezing may be influenced by quality and cost considerations. Several bakers indicated that they achieved better quality when they shifted from proofing after freezing to proofing before freezing. Specific problems when products were proofed after freezing were poor yeast action and uneven browning when products were baked. A possible explanation for these problems is that these products may have defrosted during storage or may have been stored at temperatures above freezing, thus resulting in premature activation of the yeast.

## Time Interval Between Baking and Freezing

Bakers were asked to estimate how long baked products were allowed to cool before they were frozen. More than two-thirds of all the baked products frozen by bakers were placed in the freezer within 2 hours of removal from the oven as follows:

| Time interval (hours) | Number of products |
|---|---|
| 1 or less | 159 |
| 2 | 110 |
| 3 | 33 |
| 4 | 33 |
| 5 | 10 |
| 6 | 10 |
| 7 | 3 |
| 8 and over | 15 |
| Not ascertained | 20 |
| Total | 393 |

One baker reported production of a line of fruitcake that customarily was frozen 20 to 30 days after baking. The next longest time period reported between oven and

freezer was 14 hours. The data indicate that to maintain fresh baked quality bakers generally freeze most products as soon as practicable after removal from the oven. The major exceptions to this were the products that required "aging."

## Temperatures used

Temperatures used by bakers for freezing and storing bakery products ranged widely as follows:

| Temperature (degrees Fahrenheit) | Number of bakers |
|---|---|
| +16 and higher | 8 |
| +6 to +15 | 29 |
| +5 to -5 | 73 |
| -6 to -15 | 46 |
| -16 and lower | 23 |
| Not ascertained | 6 |
| Total | 185 |

Of the 185 bakers using freezing, most had their own freezers which were set at a certain temperature and used for freezing and storing all bakery products as well as for storing frozen fruits and eggs. Thirty-two of the bakers used commercial cold storage facilities, at least part of the time, for freezing and storing bakery products. Temperatures used in these facilities were generally lower than in freezers owned by bakers.

Although there was no apparent correlation between the temperatures and the type of bakery product frozen, the lowest temperatures reported were - 40° F. for unbaked and -50° F. for baked products. Highest temperatures reported were 20° F. for unbaked and 25° F. for baked products.

Studies of freezing of bakery products suggest that most products will not freeze at the highest temperatures reported. Experiments conducted at the Western Regional Research Laboratory show that most bakery products should be frozen at -10° F. to -20° F., or lower, with air flow in the 200 to 500 cubic feet per minute range and good air circulation around individual products. A storage temperature of 0° F. is satisfactory for most products. At this temperature, bread can be held for at least 8 weeks with little or no change in quality.

## Length of Time Frozen Products Stored

Bakers reported about the same maximum time periods for frozen storage of unbaked and baked products. More than two-thirds of the number of products frozen were stored for less than a week before being baked or sold, as follows:

| Maximum time stored (days) | Number of products |
|---|---|
| 1 or less | 46 |
| 2 to 4 | 204 |
| 5 to 7 | 206 |
| 8 to 14 | 73 |
| 15 to 21 | 23 |
| 22 and over | 75 |
| Not ascertained | 5 |
| Total | 632 |

Some bakers indicated frozen products were kept in storage "indefinitely." One baker reported keeping unbaked products in frozen storage for as long as 90 days, while another had kept frozen baked fruit cakes for as long as a year.

## Use of Commercial Cold Storage Facilities

Some bakers used commercial cold storage facilities for freezing and storing bakery products. The number and percentage of bakers, by type, who employed this practice are given in table 10.

Table 10.--Bakeries using commercial facilities for freezing and storing bakery products, by type of bakery, 1961-62

| Type of bakery | Bakeries | |
|---|---|---|
| | Percent 1/ | Number |
| Single unit retail | 2 | 1 |
| Multiunit retail | 13 | 5 |
| Single unit wholesale | 39 | 13 |
| Multiunit wholesale | 73 | 11 |
| Grocery chain | 11 | 1 |
| Home service | 0 | 0 |
| Institutional | 0 | 0 |
| Combination | 7 | 1 |
| Total | 17 | 32 |

1/ Proportion of bakeries using freezing. Total is based on 185 bakeries.

The more extensive use of commercial facilities by wholesale bakers, especially multiunit wholesale bakers, was due to two factors. First, most large wholesale bakers froze bakery products only infrequently; for instance, in anticipation of heavy demand during holidays. Most bakers operating under such conditions thought it more economical to rent freezer facilities than to own them. Second, more wholesale bakers than others were experimenting with freezing.

By renting freezer space, they could learn whether freezing would be of value in their operations before investing in freezer facilities.

Specific reasons given by bakers for using commercial cold storage facilities were: (1) Do not have adequate facilities and lack room to build them; (2) volume frozen is small; and (3) using commercial facilities temporarily while experimenting with freezing.

## Defrosting of Frozen Baked Products

As indicated previously, large quantities of bakery products that have been frozen are defrosted by the baker before being sold. Bakers who followed this

practice were asked what procedures they followed, what special equipment they used, and what temperatures they used for defrosting.

Over three-fourths of the bakers who defrosted baked products did so at room temperature with no special equipment. Others used fans to blow air over the products, placed the products in or near the oven where the warmer air would hasten the defrosting, or, to prevent loss of moisture, used closed containers for defrosting.

In general, the objective was to defrost the product as rapidly as possible with a minimum of special equipment and to avoid as much as possible the condensation of moisture on the product or wrapper.

To minimize staling, defrosting should be done as rapidly as possible, although control of conditions for defrosting is not as critical as for freezing. Experiments conducted at the Western Regional Research Laboratory show that a temperature of around 120° F., with 50 to 60 percent relative humidity, gives best overall results. Each baker must evaluate the cost-quality relationship for achieving these conditions in his operation.

## Distribution Practices

Of the 185 bakers who were freezing bakery products, 55 were distributing one or more products in frozen form for a total count of 90 products. The manner in which these products were distributed varied considerably. The channels through which they were distributed and the number of products which were distributed through each are as follows:

| | Number of products |
|---|---|
| Sold at bakery or freezer plants frozen..... | 25 |
| Sold or delivered direct to retail outlets frozen..... | 34 |
| Transported to central distribution point: | |
| Delivered to retail outlets frozen..... | 25 |
| Defrosted before delivery to retail outlets.... | 6 |
| Total..... | 90 |

About the same number of bakers distributed frozen products in their own trucks with their own employees as distributed them by other methods such as common carrier. The products were sold in nearly equal quantities by salesmen employed by the bakery and by brokers and frozen food distributors.

Three of the bakers who were distributing frozen products through retail outlets found it necessary to furnish freezer cabinets to these outlets to get them to handle their products.

## Packaging Practices and Materials

Of the 632 unbaked and baked products that were reported being frozen, it was ascertained that 617 were being packaged, that is, wrapped for sale. Whether the remaining 15 products were packaged was not ascertained. Most of the unbaked products that were packaged were pies of various types; most of the baked products were breads. The extent of packaging, and the form in which frozen bakery products were packaged and distributed, are given in table 11.

Table 11.--Proportion of frozen bakery products packaged, stage at which packaging was done, and form in which distributed, 1961-62

| Packaging procedure | Unbaked products 1/ | | Baked products 2/ | |
|---|---|---|---|---|
| | 50 products sold or distributed frozen | 180 products defrosted before being sold or distributed 3/ | 44 products sold or distributed frozen | 343 products defrosted before being sold or distributed |
| | Percent | Percent | Percent | Percent |
| Packaged: | | | | |
| Before freezing | 40 | 6 | 61 | 28 |
| After freezing | 46 | 3 | 27 | 4 |
| Subtotal | 86 | 9 | 88 | 32 |
| Not packaged | 14 | 91 | 12 | 68 |
| Total | 100 | 100 | 100 | 100 |

1/ Of the 239 unbaked products being frozen, it was not ascertained whether or not 9 were being packaged.

2/ Of the 393 baked products being frozen, it was not ascertained whether or not 6 were being packaged.

3/ Unbaked products that are defrosted also are baked before being sold or distributed.

Most products that were to be sold or distributed frozen, either unbaked or baked, were packaged. About equal numbers of the unbaked products were packaged both before and after freezing. Twice the number of baked products were packaged before freezing as after. The small numbers of unbaked and baked products that were sold or distributed in frozen form without being packaged consisted mostly of products that were shipped to other bakeries for later sale by them.

Products that were to be defrosted and, in the case of unbaked products, baked before being sold or distributed, generally were not packaged. Since unbaked products that were defrosted before being sold or distributed had to be baked, packaging before freezing generally would be impractical. In the few instances where these products were packaged, bakers did not specify reasons for doing so. Baked products that were defrosted before sale were frozen unpackaged for two reasons: (1) Because experience had shown that moisture would condense on the wrapper when the product was defrosted, or (2) because the products were sold by retail bakers and were displayed unpackaged.

Significantly greater numbers of baked products were packaged before freezing than after. This was true both for products sold or distributed frozen and for products that were defrosted before being sold or distributed (table 11). A partial explanation for this may be that in large mechanized bakeries, operations through slicing and wrapping are completely mechanized but operations connected with freezing frequently are not. Thus, in these bakeries, interruption of operations to freeze the product before wrapping probably would result in higher costs.

The following packaging materials were used for products distributed in frozen form:

| | Percent of products |
|---|---|
| Rigid containers: | |
| No overwrap | 40 |
| Polyethylene overwrap | 8 |
| Other overwrap | 14 |
| Subtotal | 62 |
| Non-rigid containers: | |
| Polyethylene | 25 |
| Other | 13 |
| Subtotal | 38 |
| Grand total | 100 |

Rigid containers with no film overwrap were especially common for unbaked pies. Soft cakes and sweet yeast goods were usually packaged in rigid containers with overwraps. For bread products that were to be defrosted before distribution, the most predominant packaging material was polyehtylene film.

## BAKERS' REASONS FOR USING OR NOT USING FREEZING

The results achieved by bakers using freezing are important in appraising potentials for wider application of this innovation. Bakers using freezing were asked to give their reasons for freezing unbaked and baked products (table 12). For both unbaked and baked products about 90 percent of the replies were related to some aspect of cost reduction. About 7 percent of the replies were related to increases in sales volume.

Table 12.--Reasons given by bakers for freezing bakery products, 1961-62

| Reasons given | 119 bakers freezing unbaked products | 161 bakers freezing baked products |
|---|---|---|
| | Number | Number |
| More efficient use of production labor | 73 | 93 |
| More products available at lower cost | 34 | 62 |
| Reduced losses from stales and spoilage | 32 | 46 |
| Better utilization of production facilities | 14 | 14 |
| Increased sales by having frozen products | 14 | 13 |
| Other reasons | 9 | 8 |
| Total | 176 1/ | 236 1/ |

1/ Many bakers gave more than 1 reason for using freezing.

Bakers who were freezing some products were asked why they were not freezing additional products. In table 13, replies are grouped in categories. Bakers freezing either unbaked or baked products, by not both, were asked why they were not freezing the other form (table 14). Most replies to both of these inquiries fell into one of two categories--"no economic advantage" of "quality impaired." The "no economic advantage" category includes such statements as no labor savings, and excessive capital requirements.

Table 13.--Reasons given by bakers who froze some products for not freezing additional products, 1961-62

| Reasons | 119 bakers freezing unbaked products | 161 bakers freezing baked products |
|---|---|---|
| | Number | Number |
| No economic advantage | 101 | 113 |
| Quality impaired | 34 | 54 |
| Freezing all products now | 7 | 16 |
| Other reasons | 5 | 8 |
| Total | 147 1/ | 191 1/ |

1/ Some bakers gave more than one reason for not freezing additional products. See appendix tables 32 and 33 for breakdown of replies by type of baker and form of freezing.

Table 14.--Reasons given by bakers freezing either unbaked or baked products, but not both, for not freezing the other form, 1961-62

| Reasons | 66 bakers freezing unbaked products only | 24 bakers freezing baked products only |
|---|---|---|
| | Number | Number |
| No economic advantage | 51 | 14 |
| Quality impaired | 16 | 9 |
| Other reasons | 6 | 5 |
| Total | 73 1/ | 28 1/ |

1/ Some bakers gave more than 1 reason for not freezing the other form.

## Effect on Costs

When the 185 bakers using freezing were asked how the practice had affected their costs, 62 percent said it had decreased costs, 30 percent said it had no effect, and only 8 percent said it had increased costs. Three ways were indicated in which freezing made possible a decrease in costs:

(1) Freezing allows production of each item in larger batches and building of a a frozen inventory for later sale, rather than production of each item daily. This results in more efficient utilization of labor and facilities.

(2) Freezing permits bakers to have on hand a supply of products which can be defrosted and made readily available for sale on short notice. This reduces the risk of stale losses from a large inventory of unfrozen products or of not having all products available for sale at all times.

(3) Freezing, and subsequent distribution in frozen form, permits less frequent delivery of both baked and unbaked products to other bakeries and to grocery stores, thus resulting in lower distribution costs.

Although the majority of bakers did not indicate how much freezing had affected costs, some did make estimates. A few estimated that it had decreased costs by more than 20 percent, and a few estimated increases of 10 percent or more.

Reduction in losses from stale products is an important step in achieving greater net profit. Stale bakery products are normally considered to be those which cannot be sold at established prices because of deterioration in fresh-baked characteristics. Variation among bakeries in the amount of stale products depends on several factors, including type of product, method of selling, and standard for freshness established by each bakery. The last depends to a great extent on the demand of customers served by the bakery.

Bakers' estimates of the amount of their production that was classified as stale is shown in table 15. These estimates show that bakeries that used freezing had less stale product than bakeries that did not. More than half of the bakers using freezing, compared with only 28 percent of the bakers not using freezing, reported as little as 3 percent of their production ending up as stale products.

Table 15.--Estimated losses from stale products, by bakers using freezing and not using freezing, 1961-62

| Estimated stale losses | 185 bakers using freezing | 194 bakers not using freezing |
|---|---|---|
| | Percent | Percent |
| None | 10 | 11 |
| 1-3 percent | 44 | 28 |
| 4-6 percent | 24 | 26 |
| 7-9 percent | 8 | 14 |
| 10 percent and over | 12 | 14 |
| No estimate | 2 | 7 |
| Total | 100 | 100 |

In order to obtain a more complete evaluation of the cost of staling, bakers were asked to estimate what percentage of the original selling price of stale products was recovered either by reducing their prices or by using stale products in making poultry stuffing and other products. Slightly over a third of the bakers had no recovery at all; 25 percent recovered less than 50 percent. This indicates that, even though some bakers receive a return for some of their stale products, stale losses can be significant. The use of freezing would help to reduce these losses.

Variation in daily sales is another cause of increased cost in bakery operations. This tends to result in poor utilization of labor and facilities because variations are frequently irregular and, thus, cannot be anticipated.

The importance of variations in daily sales is shown in table 16. These variations have prompted bakers to consider the use of freezing as a means of building a frozen inventory of products on days of low demand to sell on days having greater demand. For many bakers this practice resulted in more efficient utilization of production labor and facilities.

Table 16.--Maximum daily sales variation of bakeries for the week prior to the personal interview, 1961-62 1/

| Maximum variation | Bakers | |
|---|---|---|
| | Percent | Number |
| No variation | 6 | 21 |
| 1-5 percent | 13 | 51 |
| 6-10 percent | 21 | 81 |
| 11-15 percent | 22 | 86 |
| 16-20 percent | 18 | 68 |
| 21-30 percent | 14 | 52 |
| 31-40 percent | 2 | 6 |
| 41-50 percent | 1 | 3 |
| 51 percent and over | 2/ | 1 |
| No answer | 3 | 10 |
| Total | 100 | 379 |

1/ Maximum daily sales variation refers to the difference in dollar sales volume between the day of the week having the lowest and the day having the highest sales expressed as a percentage of the total weekly sales.
2/ Less than 0.5.

## Effect on Quality

Seventy-one percent of the bakers freezing unbaked products, and 64 percent of those freezing baked products, had encountered no problems (table 17). For unbaked products, poor yeast action and carelessness by employees in taking products from the freezer in the same order in which they had been frozen were the two most important problems (table 18). For baked products, the most important problems cited by bakers were loss of moisture and poor consumer acceptance.

Although some bakers had done nothing to alleviate these problems, most bakers had attempted to correct them in one way or another. For unbaked products, two of

Table 17.--Proportion of bakers reporting problems regarding bakery products which had been frozen, 1961-62

| Replies | 119 bakers freezing unbaked products | 161 bakers freezing baked products |
|---|---|---|
| | Percent | Percent |
| No problems or complaints | 71 | 64 |
| Problems or complaints | 27 | 35 |
| No answer | 2 | 1 |
| Total | 100 | 100 |

Table 18.--Problems specified by bakers for frozen products, 1961-62

| Problems | Bakers reporting specified problems with-- 1/ | |
|---|---|---|
| | Unbaked products | Baked products |
| | Number | Number |
| Products lose moisture more rapidly | 4 | 22 |
| Poor consumer acceptance | 0 | 15 |
| Yeast action reduced | 9 | 0 |
| Employees do not handle and rotate frozen products properly | 8 | 0 |
| Products become wet and soggy | 2 | 7 |
| Products defrost in distribution channel | 2 | 0 |
| Deterioration in flavor and texture | 2 | 4 |
| Frozen products stick to pan | 2 | 0 |
| Other | 6 | 11 |
| Total | 35 | 59 |

1/ 32 bakers reported problems with unbaked products and 56 bakers with baked products. In each group, 3 bakers reported 2 problems.

the actions reported were changing to a different stabilizer in custard filled products and using lower temperatures in freezing and storage when products deteriorated in flavor and texture.

For baked products, the actions reported were the use of polyethylene wrapping to keep products from drying out, reduction in length of time frozen products were stored, use of lower temperatures in freezing and storage, and use of different stabilizers.

Sometimes bakers met the problem by ending the practice of freezing the product (table 19). A high proportion of bakers had stopped freezing yeast-raised doughnuts. These bakers said that frozen doughnuts tended to become soggy or to lose their glaze.

The 146 bakers who had discontinued freezing one product or more gave 113 replies as to why they had previously started freezing these products as follows:

| | Number |
|---|---|
| Gain economies of large batch production | 47 |
| Have line of frozen products and more products available | 32 |
| Reduce losses from spoilage and staling | 9 |
| Make better use of existing production facilities | 7 |
| Have central production of frozen unbaked products for distribution to other locations for baking | 4 |
| Other reasons | 14 |
| Total | 113 |

Table 19.--Number of bakers freezing and number who had stopped freezing specified types of bakery products, 1961-62

| Type of product | Bakers now freezing | Bakers who had stopped freezing |
|---|---|---|
| | Number | Number |
| Bread, white pan | 31 | 10 |
| Bread, all other | 54 | 13 |
| Bread rolls | 95 | 19 |
| Soft cakes | 109 | 24 |
| Sweet yeast goods | 128 | 19 |
| Pies | 73 | 22 |
| Doughnuts, cake | 29 | 9 |
| Doughnuts, yeast | 22 | 15 |
| Cookies | 27 | 2 |
| Pastries | 48 | 10 |
| Other items | 16 | 3 |

These responses again emphasize the interest in freezing as a possible means of attempting to reduce costs.

These same bakers gave 132 replies as to why they had discontinued freezing, as follows:

| | Number |
|---|---|
| Poor quality | 76 |
| Inadequate sales | 13 |
| No advantage to us | 11 |
| Inadequate facilities | 9 |
| Products discontinued | 7 |
| Other reasons | 16 |
| Total | 132 |

Carryover usually has been a problem for most bakers. Many products, cookies for example, can be carried over from one day to the next without freezing with little or no loss in quality. Most bakery products, however, deteriorate rapidly in fresh quality and, therefore, are not as acceptable to the consumer as when they are freshly baked. Information received from bakers shows that one-third of the bakers usually had no carryover, another third carried over 10 percent or less of their production, and the remaining one-third carried over more than 10 percent. Through the use of freezing, products that are not sold on the day they are baked can be carried over for sale at a later time with less deterioration in quality than products that are not frozen.

## Effect on Sales

An increase in sales volume as a result of the use of freezing was reported by a majority of bakers of nearly all types. For each type, the percentage that estimated that freezing had increased, decreased, or not affected sales volume is given in table 20.

Table 20.--Bakers' estimates of the effect their freezing of bakery products had on their sales volume, by type of bakery, 1961-62

| Type of bakery | No effect | Increased sales | Effect unknown | Total bakers | |
|---|---|---|---|---|---|
| | Percent | Percent | Percent | Percent | Number |
| Single unit retail | 38 | 60 | 2 | 100 | 53 |
| Multiunit retail | 28 | 72 | 0 | 100 | 39 |
| Single unit wholesale | 36 | 58 | 6 | 100 | 33 |
| Multiunit wholesale | 33 | 60 | 7 | 100 | 15 |
| Grocery chain | 56 | 44 | 0 | 100 | 9 |
| Home service | 100 | 0 | 0 | 100 | 2 |
| Institutional | 55 | 45 | 0 | 100 | 20 |
| Combination | 29 | 71 | 0 | 100 | 14 |

The effect of freezing on sales was evaluated for bakeries classified by type of product made and by size of the bakery as measured by weekly sales. This evaluation shows that in all size categories the majority of bakers using freezing believed that its use had helped increase their sales. The majority of bakers in all product categories indicated that freezing had enabled them to increase sales. The only exceptions were bakers selling only doughnuts or any other one product except bread.

The 111 bakers who said freezing had enabled them to increase sales were asked how much of an increase they were able to achieve. About two-thirds reported gains of 1 to 10 percent, a few indicated gains of as much as 25 percent, and the remainder could not give a definite estimate. These 111 bakers gave 120 replies indicating how freezing had enabled them to increase sales, as follows:

| | Number |
|---|---|
| A wider variety of products always available | 78 |
| A line of frozen products | 20 |
| Products that are of fresher quality | 17 |
| Other reasons | 5 |
| Total | 120 |

These replies indicate that a majority of these bakers thought that freezing enabled them to increase sales by enabling them to offer more products to consumers at all times. It would, of course, be possible to achieve larger sales without using freezing by having large inventories of unfrozen products but this would result in larger stale losses. Of less importance, but still a significant factor in increasing sales, was the use of freezing for offering consumers a line of bakery products in frozen form.

The effect of the availability of frozen bakery products in grocery stores on fresh product sales was evaluated by bakers.

Most bakers in each classification believed that sales of frozen products through grocery stores had been cutting into their sales of fresh products (table 21). The only exceptions to this were single unit wholesale bakers and institutional bakers. The latter served most of their products for consumption on the premises where they were baked.

Table 21.--Bakers' estimates of the effect availability of frozen bakery products in the grocery store had on sales of their fresh bakery products, 1961-62

| Type of bakery | No effect | Decreased sales | No answer | Total | Number of bakers |
|---|---|---|---|---|---|
| | Percent | Percent | Percent | Percent | Number |
| Single unit retail | 41 | 58 | 1 | 100 | 1/106 |
| Multiunit retail | 22 | 76 | 2 | 100 | 59 |
| Single unit wholesale | 45 | 44 | 11 | 100 | 62 |
| Multiunit wholesale | 45 | 53 | 2 | 100 | 45 |
| Grocery chain | 26 | 70 | 4 | 100 | 23 |
| Home service | 17 | 83 | 0 | 100 | 12 |
| Institutional | 74 | 13 | 13 | 100 | 47 |
| Combination | 46 | 54 | 0 | 100 | 24 |

1/ Of the 107 single unit retail bakers interviewed, 1 expressed the opinion that availability of frozen bakery products had increased sales of fresh products.

Available statistics show that sales of frozen bakery products through grocery stores, especially sweet goods, cakes, and pies, have been increasing rapidly. In November 1963 the editor of Quick Frozen Foods estimated that sales of unbaked fruit pies were valued at from $90 to $100 million retail annually, and were continuing to expand. All other frozen bakery products were valued at around $80 million, with new products being added weekly. 5/

Of the 379 bakers interviewed, 181 said they had experienced losses in fresh sales because of sales of frozen products through grocery stores. These 181 bakers were asked what changes they had made in their practices to counteract these losses. Seventy-eight of these bakers said they had made no changes in their practices. The remaining 103 gave 118 replies, as follows:

| | Number |
|---|---|
| Produced a superior product | 33 |
| Increased promotion and special sales | 26 |
| Increased number of varieties | 24 |
| Expanded production of frozen products | 21 |
| Other changes | 14 |
| Total | 118 |

Although bakers may have been correct in assuming that increased sales of frozen bakery products through grocery stores resulted in reduced sales of fresh bakery products, in most cases this was probably a very minor cause. More likely the decline in sales experienced by many small bakers was caused by the long-time decline in the per capita consumption of bread and to the growth in importance of the grocery store as a center for all food purchases, including bakery products.

5/ Williams, E. E. What's Ahead in Frozen Foods. Quick Frozen Foods 26(4): 57, Nov. 1963.

## OUTLOOK FOR USE OF FREEZING BY BAKERS

### Bakers' Expectations

The 185 bakers using freezing were asked to indicate whether they expected to increase, decrease, or maintain the present extent of freezing. A greater percentage of grocery-chain and wholesale bakeries were expecting to increase their use of freezing than other types of bakeries (table 22).

Table 22.--Expectations of bakers who were freezing bakery products, by type of bakery, 1961-62

| Type of bakery | Increase | Decrease | Maintain present extent | No answer | Total bakers | |
|---|---|---|---|---|---|---|
| | Percent | Percent | Percent | Percent | Percent | Number |
| Single unit retail | 57 | 4 | 39 | 0 | 100 | 53 |
| Multiunit retail | 54 | 3 | 41 | 2 | 100 | 39 |
| Single unit wholesale | 61 | 3 | 33 | 3 | 100 | 33 |
| Multiunit wholesale | 67 | 0 | 33 | 0 | 100 | 15 |
| Grocery chain | 78 | 11 | 11 | 0 | 100 | 9 |
| Home service | 50 | 0 | 50 | 0 | 100 | 2 |
| Institutional | 45 | 0 | 55 | 0 | 100 | 20 |
| Combination | 36 | 0 | 64 | 0 | 100 | 14 |

The 194 bakers not using freezing were asked whether they expected to initiate freezing in the near future. Wholesale bakers had the highest percentage expecting to start freezing (fig. 6).

Evaluations regarding the future importance of frozen bakery product sales were made by all bakers interviewed (table 23). Although the majority believed that sales of frozen bakery products would increase in the future, bakers who were freezing bakery products were somewhat more optimistic about the growth of sales. These data were analyzed by type of firm and showed that a majority of bakers in each type expected sales of frozen bakery products to increase (fig. 6).

The 296 bakers who expected sales of frozen bakery products to increase gave 431 replies as to why they expected this increase, as follows:

| | Number |
|---|---|
| More convenient for consumer shopping and use | 173 |
| A trend toward more frozen products | 103 |
| Fresher quality products | 60 |
| Reduced stale losses and distribution costs | 56 |
| Home freezing space increasing | 30 |
| Other reasons | 9 |
| Total | 431 |

Convenience for consumer shopping and use was defined by most bakers as the opportunity to purchase a variety of bakery goods in the grocery store when purchasing other foods and the opportunity to have frozen bakery products available at

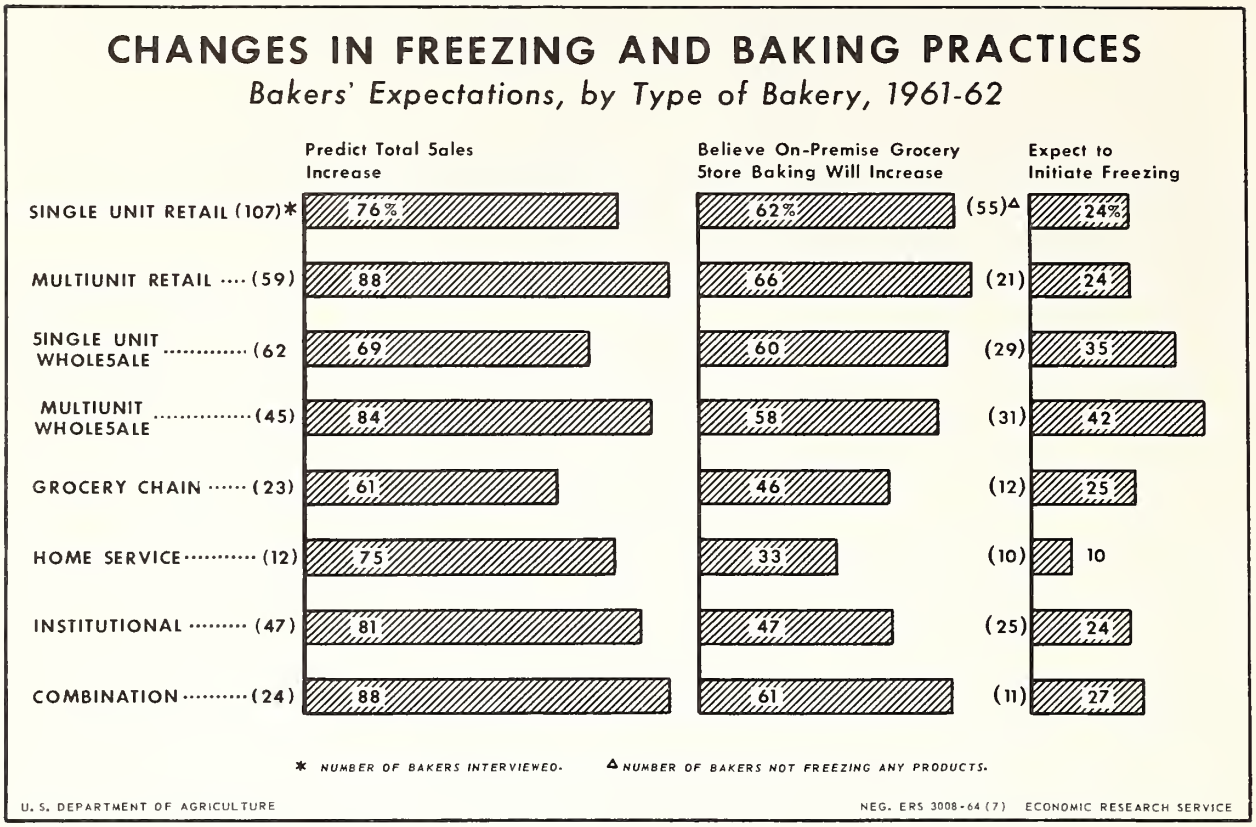


Figure 6

all times in the home. Bakers indicated that there was increasing acceptance of frozen foods in general and a growing use of home freezers, both of which they believed would result in greater consumer acceptance of frozen bakery products.

In contrast, 65 bakers gave 76 replies as to why they did not expect an increase, as follows:

| | Number |
|---|---|
| Consumers prefer unfrozen products | 34 |
| Inferior quality of products that have been frozen | 14 |
| Lack of freezer space in the store | 9 |
| Cost of handling frozen products | 5 |
| Saturated market for frozen products | 5 |
| Other reasons | 9 |
| | 76 |

Research done at the Western Regional Research Laboratory shows that freezing of bakery products under proper conditions results in little or no quality deterioration. Thus the two reasons most often given by bakers for not expecting an increase in freezing suggest that bakers' experiences with unfavorable acceptance of products that have been frozen may have been due to the use of poor freezing practices.

Bakers' opinions about the future sales potential of frozen bakery products also were analyzed on the basis of type of product and weekly sales volume of bakeries.

Table 23.--Appraisal of the future importance of frozen bakery product sales, by bakers using freezing and not using freezing, 1961-62

| Appraisal of frozen sales | 185 bakers using freezing | 194 bakers not using freezing |
|---|---|---|
| | Percent | Percent |
| Will become more important | 85 | 71 |
| Will not become more important | 13 | 22 |
| No answer | 2 | 7 |
| Total | 100 | 100 |

This analysis shows that bakers producing a large variety of products were more inclined to believe that frozen bakery product sales would increase in the future. Likewise, the larger the weekly sales volume of a bakery, the more prone the baker was to believe that sales of frozen bakery products would increase.

All bakers were asked about their expectations for freezing specified products. The number of bakers expecting to increase, decrease, or start freezing specific items is given in table 24.

Those expecting to increase or initiate the use of freezing were asked their reasons, which are given in table 25. These data show the importance of the expected effect of freezing in reducing costs and increasing sales.

Of the 54 bakers who were expecting to initiate freezing, 39 gave 50 replies for not freezing at the present time, as follows:

| | Number |
|---|---|
| Lack of facilities and floor space | 24 |
| Lack of capital | 10 |
| No advantage at present | 7 |
| Customers not ready to change | 2 |
| Lack of knowledge of proper handling | 3 |
| Other reasons | 4 |
| Total | 50 |

These replies suggest that many bakers recognize the advantage of freezing but face barriers to its introduction in their operations.

The 140 bakers not presently freezing, who did not expect to initiate its use, gave 166 replies as to why they were not expecting to initiate it, as follows:

| | Number |
|---|---|
| Frozen products not as good in quality | 38 |
| No advantage in our bakery | 26 |
| No space or facilities | 26 |
| Can adjust production to demand without freezing | 17 |
| Production costs too high | 12 |
| Customers prefer unfrozen products | 12 |
| Lack knowledge of proper handling | 10 |
| Costs too much to distribute frozen | 8 |
| Other reasons | 17 |
| Total | 166 |

Table 24.--Plans of bakers for freezing specified bakery products, 1961-62

| Type of product | 185 bakers freezing | | | 54 bakers not freezing planning to start |
|---|---|---|---|---|
| | Planning no change | Planning to increase | Planning to decrease | |
| | Number | Number | Number | Number |
| Bread, white pan | 27 | 4 | 0 | 10 |
| Bread, all other | 46 | 7 | 1 | 11 |
| Bread rolls | 88 | 6 | 1 | 21 |
| Soft cakes | 99 | 9 | 1 | 25 |
| Sweet yeast goods | 111 | 8 | 0 | 17 |
| Pies | 66 | 7 | 0 | 13 |
| Doughnuts, cake | 26 | 3 | 0 | 6 |
| Doughnuts, yeast | 21 | 1 | 0 | 6 |
| Cookies | 25 | 2 | 0 | 2 |
| Pastries | 47 | 1 | 0 | 2 |
| Other items | 14 | 2 | 0 | 6 |

Table 25.--Bakers' reasons for expecting to increase or initiate freezing 1961-62

| Reasons given | 99 bakers expecting to increase freezing 1/ | 54 bakers expecting to initiate freezing 2/ |
|---|---|---|
| | Number | Number |
| Make more efficient use of production labor | 30 | 25 |
| Have line of frozen products available | 40 | 7 |
| Have more products available at all times | 17 | 7 |
| Reduce losses from spoilage and stales | 10 | 11 |
| Make better use of production facilities | 11 | 4 |
| Reduce distribution costs | 2 | 2 |
| Other reasons | 2 | 3 |
| Total | 112 | 59 |

1/ 6 bakers gave no reasons.
2/ 4 bakers gave no reasons.

## Obstacles to Acceptance of Frozen Bakery Products

Preference for unfrozen bakery products was cited by bakers as the major obstacle to acceptance of frozen bakery products by consumers. When the 379 bakers interviewed were asked what obstacles they believed there were to getting

wide-scale acceptance of frozen bakery products by consumers, 106 said there were no obstacles. Of the remainder, 33 gave no reply and 240 gave 286 replies, as follows:

| | Number |
|---|---|
| Consumers prefer unfrozen products | 183 |
| Lack of home freezer space | 43 |
| Frozen products cost more | 30 |
| Frozen products less convenient | 17 |
| Other obstacles | 13 |
| Total | 286 |

Despite bakers' indications that consumers prefer to purchase unfrozen bakery products, the majority also indicated that many consumers freeze bakery products which they buy in unfrozen form. This practice permits consumers to adapt home freezer space to the problem of maintaining supplies of fresh bakery products. A high percentage of bakers observed that some of their customers were freezing bakery products, on the following evidence: (1) Customers purchase large quantities of a product at special price discounts, (2) customers state that they freeze bakery products, (3) customers request that products be packaged for freezing, and (4) customers ask if products can be frozen.

This evidence indicates that although many consumers have found freezing of bakery products in the home to be acceptable, many still have some resistance to purchasing bakery products in frozen form.

Grocers and frozen-food distributors often face problems that present obstacles to their acceptance of frozen bakery products. Bakers cited lack of freezer space as the major obstacle for grocers and lack of freezer space and higher cost of handling as major obstacles for frozen-food distributors (table 26). It should be emphasized that these are only bakers' opinions.

## Other Forces That May Influence Bakers' Use of Freezing

### On-Premise Baking

On-premise baking in grocery stores is a practice that seems to be receiving increasing attention. Many bakers thought this practice would increase (fig. 6).

The 218 bakers who thought it would increase gave 259 replies as to why they thought so, as follows:

| | Number |
|---|---|
| Appeal of aroma and appearance of fresh baked products | 132 |
| Offers consumers "one-stop" shopping convenience | 47 |
| Being used as a drawing card and traffic builder | 44 |
| Other reasons | 36 |
| Total | 259 |

In comparison, the 139 bakers who believed that on-premise baking in grocery stores would not increase gave 180 replies, as follows:

| | Number |
|---|---|
| Costs more than producing at a central plant | 92 |
| Inadequate supply of qualified bakers | 32 |
| Inadequate volume of sales | 20 |
| Quality control more difficult than in a central plant | 13 |
| Other reasons | 23 |
| Total | 180 |

Table 26.--Obstacles cited by bakers to further acceptance of frozen bakery products by grocers and frozen food distributors, 1961-62

| Obstacles cited | Bakers citing obstacles for: | |
|---|---|---|
| | Grocers | Frozen food distributors |
| | Percent 1/ | Percent 1/ |
| No obstacles | 28 | 37 |
| Inadequate freezer space | 38 | 10 |
| High cost of handling | 3 | 15 |
| Product deterioration through improper handling | 6 | 7 |
| Insufficient sales volume and promotion | 6 | 2 |
| Other obstacles | 4 | 5 |
| No answer | 15 | 24 |
| Total | 100 | 100 |
| Number of replies | 396 | 388 |
| Number of bakers | 379 | 379 |

1/ Based on number of replies.

Many bakers believed it would cost more to have a bakery unit at each grocery store than to produce in a central plant. In contrast, they recognized the advantages of on-premise baking in creating demand for bakery products. The application of freezing in this situation actually makes it possible for the baker to "have his cake and eat it too." A few bakers already were making up products in a central plant where large-scale economies and better quality control were possible. These products were then frozen and shipped to bakeries in grocery stores where they were baked. Additional advantages cited for this practice were greater flexibility in adjusting to variable demand, thus reducing losses from staling, and being able to offer a wider variety of products at lower cost than if products were made up at the on-premise bakery.

## Exchange of Products

Exchange of products among bakers permits product specialization and is used to increase the variety of products sold. Product specialization permits making larger batches, thus resulting in production economies. More of the multiunit wholesale bakers interviewed followed this practice than did other bakers (table 27). Retail bakers normally make a greater variety of products than wholesale bakers and, thus, have less need for acquiring additional products from other bakeries.

Table 27.--Proportion of bakeries, by type, that received products from other bakeries, 1961-62

| Type of bakery | Total bakeries | Proportion receiving products from others |
|---|---|---|
| | Number | Percent |
| Single unit retail | 107 | 21 |
| Multiunit retail | 59 | 49 |
| Single unit wholesale | 62 | 27 |
| Multiunit wholesale | 45 | 80 |
| Grocery chain | 23 | 65 |
| Home service | 12 | 67 |
| Institutional | 47 | 64 |
| Combination | 24 | 50 |

The findings also show that (1) bakeries producing primarily bread products were most likely to receive products from others, (2) most bakeries receiving products from other bakeries received from one to three products and (3) nearly three-fourths of the bakeries that received any specific product from another bakery obtained their entire volume of that product from that bakery.

The use of freezing would facilitate the transfer of products among bakeries by permitting bakers to ship less frequently and over greater distances.

## Quantity Discounting

Quantity discounting is a fairly common practice among bakers. Thirty-seven percent of the bakers interviewed stated that they gave quantity discounts to consumers, but most of them sold less than 5 percent of their production at discounted prices.

More retail bakers than other types were found to be giving quantity discounts. Many of these said that customers who purchased in large quantities came from long distances and purchased infrequently. These customers often told bakers that they froze their purchases of bakery products. Quantity discounts by retail bakers may continue to grow as a competitive practice to counteract the losses in sales being experienced by these bakers.

The two most important reasons given by wholesale bakers for not discounting were that the practice was not profitable and that it was unfair to their wholesale customers. Loss of goodwill of these customers also was mentioned as being a deterrent to discounting.

Of those bakers discounting, about two-thirds stated they did not plan to increase the quantity sold at a discount. The most important reason given was that there was not enough profit in this practice. The possibility of increasing their sales volume was the most important reason given by bakers planning to increase discounting.

Bakers desiring to increase the practice of quantity discounting could accomplish this by promoting the practice of freezing bakery products by their customers.

## Bakers' Expectations

Distribution of bakery products in frozen form is receiving careful consideration by many wholesale and grocery-chain bakers. The 105 wholesale and grocery-chain bakers who were interviewed were asked whether they thought frozen distribution would replace present methods (table 28). The 34 bakers who indicated that they thought it would, gave 53 replies about their expectations, as follows:

| | Number |
|---|---|
| Frozen distribution reduces stale losses | 15 |
| Frozen distribution reduces distribution costs | 14 |
| Partial replacement by frozen distribution with reservations: | |
| For certain products, but not for bread | 7 |
| Modified frozen distribution | 4 |
| Frozen distribution permits stabilization of production | 6 |
| Other reasons | 7 |
| Total | 53 |

Some of these bakers thought that bread might be frozen in the production-distribution cycle, but not sold to the consumer in that form.

Of the remaining 71 wholesale and grocery-chain bakers interviewed, 67 thought frozen distribution would not replace present methods. They gave 84 replies, as follows:

| | Number |
|---|---|
| Costs too much | 20 |
| Consumers prefer unfrozen products | 19 |
| Sales volume too small and potential limited | 17 |
| Inferior quality of frozen products | 15 |
| Retail stores lack adequate facilities for handling | 6 |
| Other reasons | 7 |
| Total | 84 |

As with the use of freezing in general, the major limitation was the anticipated higher costs. A preliminary study indicates that the marketing of frozen bread through grocery stores could result in a potential saving of 2 cents per pound loaf due primarily to less frequent delivery. 6/ A study of the costs of alternative methods of distributing bakery products now underway in the Department will include a more comprehensive evaluation of the impact of frozen distribution on costs.

## Influence of Private Labeling

Private labeling of bakery products is expected by bakers, especially multiunit wholesale bakers, to become more important in the future (table 28). Because of the large expenditures made by wholesale bakers in brand identification, this change is

6/ Enochian, Robert V. Marketing Frozen Bread--A Preliminary Report. U.S. Dept. Agr., Agr. Mktg. Serv. AMS-395, Aug. 1960, 15 p.

Table 28.--Wholesale and grocery-chain bakers' evaluations of the future of frozen product distribution and private labeling of bakery products, 1961-62

| Type of bakery | Bakers interviewed who believed-- | | Total bakers |
|---|---|---|---|
| | Frozen distribution will replace present methods | Private labeling will become more important | |
| | Percent | Percent | Number |
| Single unit wholesale | 20 | 56 | 41 |
| Multiunit wholesale | 37 | 85 | 41 |
| Grocery chain | 48 | 61 | 23 |
| All | 32 | 68 | 105 |

being made reluctantly and usually only when bakers are forced into it to maintain efficient production levels.

Some of the reasons given by wholesale and grocery chain bakers for expecting private labeling of bakery products to become more important were as follows: (1) Grocery chains want their own label for promotion and brand identification; (2) other grocery stores want bakery products at lower prices to be able to compete with grocery-chain brands; and (3) wholesale bakers will increase their sales of private-label products to discourage grocery chains from building or purchasing their own baking facilities.

Bakers who did not expect sales of private-label bakery products to increase gave the following reasons: (1) Wholesale bakers don't want to become "captive" suppliers of the grocery chains and lose control over their products and their identification; and (2) consumers prefer to purchase established manufacturers' brands.

The preponderance of evidence seems to indicate that, despite some reluctance, wholesale bakers are supplying increasing quantities of private-label bakery products to grocery chains. In the opinion of the authors, this practice will tend to create an environment in which the distribution and sales of frozen products will become increasingly important. One of the major deterrents to distribution of frozen products by wholesale bakers has been the bakers' unwillingness to lose control over displays and contacts with consumers. To the degree that these advantages are lost because of private labeling, this deterrent will lose its force.

## IMPLICATIONS FOR THE FUTURE

Bakers' replies to the various questions asked of them, and observations made since completion of the survey on which this report is based, suggest that there will be a significant increase in the use of freezing as a means of achieving a more economical internal organization of individual bakeries. The rate at which this increase takes place will depend largely on the rate at which bakers are convinced (1) that the use of freezing will enable them to increase their profits, and (2) that the freezing, frozen storage, and defrosting of bakery products may be carried out with no appreciable changes in fresh-baked quality. The proper technical conditions for achieving this latter have been specified for most baked products by the Department's Western Regional Research Laboratory. Work is now being planned for specifying proper technical conditions for unbaked products.

Whether products that are frozen are sold in frozen form or are defrosted and, if unbaked, baked before being sold, depends on the acceptance of frozen products by consumers, on the willingness of grocery-store managers to make the necessary capital investments in freezer facilities for handling these products, and on the nature of competition in the wholesale segment of the industry.

In view of the convenience in ready availability and the new product forms made possible by freezing, and in view of the evidence that many consumers are now buying frozen bakery products or are at least freezing bakery products in their homes, it would seem that continued growth in consumer acceptance of frozen bakery products can be expected. The rate will depend largely on the quality experienced by consumers in frozen products and on the relative prices of frozen products compared with their unfrozen counterparts. Evidence from this and other studies suggests that both production and distribution economies are possible with freezing, making it possible to offer consumers frozen products at prices lower than their unfrozen forms.

The most important barrier to the increased growth in distribution and sales of frozen bakery products is the competitive structure of the wholesale segment of the baking industry. In this segment most competition is in the form of nonprice factors, such as daily or more frequent delivery to each grocery store served by a driver-salesman to assure his company's brand the most favorable display possible. Savings with frozen distribution can be achieved only if these practices are modified and delivery is on a less frequent schedule. The growth in baking by grocery chains, and their demand for more private-label bakery products, portend an end to the wholesale driver-salesman system of bakery product distribution as it exists today. Some grocery chains that bake for their own stores already have shifted to distribution and sale of frozen bakery products. As these changes continue, distribution and sale of bakery products in frozen form will become a more acceptable alternative to methods of distribution now being used by wholesale bakers.

## APPENDIX

Table 29.--Bakers interviewed, by type of bakery and by type of products made, 1961-62

| Type of products made | Single unit retail | Multi-unit retail | Single unit wholesale | Multi-unit wholesale | Grocery chain | Home service | Institutional | Combination | All types |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| 100% bread products | 3 | 1 | 9 | 17 | 3 | 1 | 0 | 1 | 35 |
| 100% doughnuts | 15 | 1 | 4 | 0 | 0 | 0 | 0 | 3 | 23 |
| 100% one other product | 1 | 0 | 13 | 3 | 0 | 0 | 2 | 0 | 19 |
| 51-99% bread products | 8 | 3 | 15 | 15 | 9 | 8 | 5 | 2 | 65 |
| 51-99% doughnuts | 10 | 1 | 7 | 1 | 0 | 0 | 1 | 1 | 21 |
| 51-99% one other product | 7 | 3 | 8 | 4 | 0 | 0 | 10 | 1 | 33 |
| Combination 1/ | 56 | 46 | 5 | 4 | 9 | 3 | 25 | 15 | 163 |
| Not ascertained | 7 | 4 | 1 | 1 | 2 | 0 | 4 | 1 | 20 |
| All | 107 | 59 | 62 | 45 | 23 | 12 | 47 | 24 | 379 |

1/ Combination refers to bakeries which had 50 percent or less of their total production in any one product.

Table 30.--Bakers interviewed, by type of bakery and by sales volume, for week prior to personal interview, 1961-62

| Weekly sales volume | Single unit retail | Multi-unit retail | Single unit wholesale | Multiunit wholesale | Grocery chain | Home service | Institutional | Combination | All types |
|---|---|---|---|---|---|---|---|---|---|
| Dollars | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| Under 1,000 | 49 | 5 | 7 | 2 | 0 | 0 | 15 | 10 | 88 |
| 1,000-2,499 | 40 | 20 | 8 | 0 | 1 | 2 | 11 | 6 | 88 |
| 2,500-4,999 | 16 | 14 | 14 | 2 | 1 | 0 | 8 | 1 | 56 |
| 5,000-9,999 | 2 | 11 | 10 | 1 | 2 | 0 | 4 | 5 | 35 |
| 10,000-24,999 | 0 | 5 | 11 | 3 | 1 | 0 | 4 | 1 | 25 |
| 25,000-49,999 | 0 | 2 | 2 | 4 | 5 | 1 | 1 | 0 | 15 |
| 50,000-74,999 | 0 | 2 | 2 | 6 | 3 | 1 | 0 | 0 | 14 |
| 75,000-100,000 | 0 | 0 | 3 | 5 | 1 | 1 | 0 | 0 | 10 |
| Over 100,000 | 0 | 0 | 4 | 16 | 7 | 7 | 1 | 1 | 36 |
| Not ascertained | 0 | 0 | 1 | 6 | 2 | 0 | 3 | 0 | 12 |
| All | 107 | 59 | 62 | 45 | 23 | 12 | 47 | 24 | 379 |

Table 31.--Bakers interviewed, by type of bakery and by number of bakeries owned by firm, 1961-62

| Number of bakeries owned by firm | Single unit 1/ retail | Multi-unit retail | Single unit wholesale | Multi-unit wholesale | Grocery chain | Home service | Institutional | Combination | All types |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| 1 | 86 | 35 | 59 | 0 | 7 | 9 | 33 | 17 | 246 |
| 2 | 2 | 16 | 0 | 9 | 1 | 1 | 3 | 6 | 38 |
| 3-5 | 6 | 3 | 0 | 8 | 5 | 0 | 3 | 1 | 26 |
| 6-10 | 3 | 2 | 0 | 3 | 4 | 0 | 3 | 0 | 15 |
| 11-25 | 2 | 0 | 0 | 4 | 5 | 0 | 2 | 0 | 13 |
| 26-50 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 6 |
| 51-75 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 6 |
| 76-100 | 1 | 0 | 0 | 12 | 0 | 1 | 0 | 0 | 14 |
| Over 100 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Not ascertained | 6 | 1 | 3 | 1 | 1 | 0 | 2 | 0 | 14 |
| All | 107 | 59 | 62 | 45 | 23 | 12 | 47 | 24 | 379 |

1/ In cases where more than 1 bakery was owned by the firm, there was no exchange of product between bakeries, or the product was sold through one outlet only. Such a bakery also may have been part of a franchise operated as a separate entity.

Table 32.--Bakers' reasons for not freezing additional unbaked products, by type of bakery, 1961-62

| Reasons | Single unit retail | Multi-unit retail | Single unit wholesale | Multi-unit wholesale | Grocery chain | Home service | Institutional | Combination | All types |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| No economic advantage 1/ | 32 | 30 | 10 | 2 | 7 | 2 | 14 | 4 | 101 |
| Impaired quality | 15 | 6 | 4 | 2 | 2 | 0 | 2 | 3 | 34 |
| Freezing all unbaked products now | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 7 |
| Other reasons | 0 | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 5 |
| Total | 47 | 37 | 19 | 7 | 11 | 2 | 16 | 8 | 147 |
| Number of bakers interviewed 2/ | 40 | 29 | 15 | 6 | 7 | 1 | 13 | 8 | 119 |

1/ No economic advantage includes:
(a) No advantage in our operation,
(b) Some products cannot be made in large batches,
(c) Have a stable demand, and
(d) Would cost more and lack facilities.

2/ Some bakers gave more than 1 reason; 1 baker gave no reason.

Table 33.--Bakers' reasons for not freezing additional baked products by type of bakery, 1961-62

| Reasons | Single unit retail | Multi-unit retail | Single unit wholesale | Multi-unit wholesale | Grocery chain | Home service | Institutional | Combination | All types |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Number | Number | Number | Number | Number | Number | Number | Number |
| No economic advantage 1/ | 33 | 30 | 16 | 7 | 4 | 1 | 15 | 7 | 113 |
| Impaired quality | 23 | 10 | 6 | 2 | 3 | 0 | 4 | 6 | 54 |
| Freezing all baked products now | 2 | 2 | 8 | 2 | 1 | 0 | 0 | 1 | 16 |
| Other reasons | 1 | 1 | 1 | 0 | 2 | 0 | 2 | 1 | 8 |
| Total | 59 | 43 | 31 | 11 | 10 | 1 | 21 | 15 | 191 |
| Number of bakers interviewed 2/ | 49 | 33 | 25 | 12 | 9 | 1 | 18 | 14 | 161 |

1/ No economic advantage includes:
(a) Freezing doesn't save labor,
(b) No advantage in freezing baked,
(c) Don't have enough daily variation, and
(d) Lack space and facilities.

2/ Some bakers gave more than 1 reason; 2 bakers gave no reason.

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